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APPENDIX A1

CLAIMS

GROUP TOO

What is claimed is:

1. (Twice Amended) Liquid crystal compounds having the general structure:

$$R_{\overline{n}}$$
 Z_1
 Y_1
 X_2
 Y_2

(Structure IV)

wherein X is selected from the group consisting of

OCF₃(trifluoromethoxy), and NCS (isothiocyanate);

 T_1 is a triple bond;

 Y_1 and Y_2 are a pair of substituents selected from the group consisting of H and F, and Y_1 = Y_2 ;

 Z_1 and Z_2 are a pair of substituents selected from the group consisting of H and F, and Z_1 = Z_2 ; and,

at least one of the pairs Y_1 and Y_2 and Z_1 and Z_2 are substituted with F;

Rn is selected from the group consisting of an alkyl group having the general formula C_nH_{2n+1} , an alkenyl group having the general formula C_nH_{2n-1} , an alkoxy group having the general formula OC_nH_{2n+1} , an alkenoxy group having the general formula OC_nH_{2n-1} , and a group of the general structure

$$R_{\overline{x}}$$

(Structure VII)

Cont:

wherein R_x is selected from a group consisting of an alkyl group having the general formula C_xH_{2x+1} , an alkenyl group having the general formula C_xH_{2x-1} , an alkoxy group having the general formula OC_xH_{2x+1} , and an alkenoxy group having the general formula OC_xH_{2x-1} ; and,

wherein n is an integer greater than 0 and x is an integer greater than 0.

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- 2. Cancelled.
- 3. A liquid crystal compound as set forth in claim 1, wherein R_n is selected from a group consisting of an alkyl group having the general formula C_nH_{2n+1}, an alkenyl group having
 the general formula C_nH_{2n-1}, an alkoxy group having the general formula OC_nH_{2n+1}, and an alkenoxy group having the general formula OC_nH_{2n-1} where n is approximately 2 to 12.
- 4. A liquid crystal compound as set forth in claim 1, wherein R_x is selected from a group consisting of an alkyl group having the general formula C_xH_{2x+1}, an alkenyl group having
 the general formula C_xH_{2x-1}, an alkoxy group having the general formula OC_xH_{2x+1}, and

Appendix A1 Page 3 of 17

an alkenoxy group having the general formula OC_xH_{2x-1} where x is approximately 2 to 12.

 \mathcal{L}_{5} . A liquid crystal compound as set forth in claim 1, wherein R_n is an alkenyl group baving the general formula C_nH_{2n-1} .

6. A liquid crystal compound as set forth in claim 1, wherein R_n is an alkenyl group having the general formula C_nH_{2n-1} where n ranges approximately from 2 to 12.

7. A liquid crystal compound as set forth in claim 1, wherein R_n is an alkenyl group having the general formula $C_xH_{2x-1}CH=CH-(CH_2)$.

8. (Twice Amended) Liquid crystal compounds having the general structure

15 (Structure V)

wherein X is selected from the group consisting of F (fluoro), OCF₃(trifluoromethoxy), and NCS (isothiocyanate);

Appendix A1 Page 4 of 17

T₁ is selected from the group consisting of a triple and a double covalent bond between two carbons;

T₂ is selected from the group consisting of a triple and a double covalent bond between two carbons; and,

5 T_1 is not equal to T_2 when T_1 or T_2 is a double bond;

 Y_1 and Y_2 are a pair of substituents selected from the group consisting of H and F and Y_1 = Y_2 ;

 Z_1 and Z_2 are a pair of substituents selected from the group consisting of H and F and Z_1 = Z_2 ;

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 A_1 and A_2 are a pair of substituents selected from the group consisting of H and F and A_1 = A_2 ;

at least one of the pairs Y_1 and Y_2 , Z_1 and Z_2 , and A_1 and A_2 is substituted with F; and, R_m is selected from the group consisting of an alkyl group having the general formula C_mH_{2m+1} , an alkenyl group having the general formula C_mH_{2m-1} , an alkoxy group having the general formula OC_mH_{2m+1} , and an alkenoxy group having the general formula OC_mH_{2m-1} , wherein m is an integer greater than 0; and,

wherein when T_1 and T_2 are both triple bonds and R_m is an alkyl group, one and only one of the pairs Y_1 and Y_2 , Z_1 and Z_2 , and Z_1 and Z_2 are both triple bonds and Z_2 is substituted with Z_1 .

9. A liquid crystal compound as set forth in claim 8, wherein X is a substituted with F; Y₁ and Y₂ are substituted with F; and,

Appendix A1 Page 5 of 17

 Z_1 and Z_2 and A_1 and A_2 are H groups.

 \mathcal{L} 10. A liquid crystal compound as set forth in claim 8, wherein T_1 and T_2 are triple bonds between two carbons.

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- Mail 11. A liquid crystal compound as set forth in claim 8, wherein R_m is selected from a group consisting of an alkyl group having the general formula C_mH_{2m+1}, an alkenyl group having the general formula C_mH_{2m-1}, an alkoxy group having the general formula OC_mH_{2m+1}, and an alkenoxy group having the general formula OC_mH_{2m-1} where m is approximately 2 to 12.
- 12. A liquid crystal compound as set forth in claim 8, wherein R_m is an alkenyl group having the general formula C_mH_{2m-1} .
- 15. A liquid crystal compound as set forth in claim 8, wherein R_m is an alkenyl group having the general formula C_mH_{2m-1} where m ranges approximately from 2 to 12.
- 14. A liquid crystal compound as set forth in claim 8, wherein R_m is an alkenyl group having the general formula $C_mH_{2m-1}CH=CH-(CH_2)$.

15. (Twice Amended) A eutectic mixture of liquid crystal compounds comprising at least two liquid crystal compounds, including at least one compound having the general structure

$$R_{n}$$
 Z_{1}
 Y_{1}
 X_{2}
 Y_{2}

5 (Structure IV)

wherein X is selected from the group consisting of OCF3(trifluoromethoxy), and NCS (isothiocyanate);

 T_1 is a triple bond;

 Y_1 and Y_2 are a pair of substituents selected from the group consisting of H and F and Y_1

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 Z_1 and Z_2 are a pair of substituents selected from the group consisting of H and F and Z_1 = Z_2 ;

at least one of the pairs Y_1 and Y_2 and Z_1 and Z_2 are substituted with F;

R_n is selected from the group consisting of an alkyl group having the general formula

C_nH_{2n+1}, an alkenyl group having the general formula C_nH_{2n-1}, an alkoxy group having the general formula OC_nH_{2n+1}, an alkenoxy group having the general formula OC_nH_{2n-1}, and a group of the general structure

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$$R_{\overline{x}}$$

(Structure VII)

wherein R_x is selected from a group consisting of an alkyl group having the general formula C_xH_{2x+1} , an alkenyl group having the general formula C_xH_{2x-1} , an alkoxy group having the general formula $-OC_xH_{2x+1}$, and an alkenoxy group having the general formula $-OC_xH_{2x-1}$; and,

wherein n is an integer greater than 0 and x is an integer greater than 0

16. (Twice Amended) A eutectic mixture of liquid crystal compounds comprising at least two liquid crystal compounds including at least one compound having the general structure



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$$R_m$$
 T_2
 T_1
 T_1
 T_2
 T_1
 T_2
 T_1

(Structure V)

wherein X is selected from the group consisting of F (fluoro), OCF₃(trifluoromethoxy),

and NCS (isothiocyanate);

T₁ is selected from the group consisting of a triple and a double covalent bond between two carbons;

Appendix A1 Page 8 of 17

T₂ is selected from the group consisting of a triple and a double covalent bond between two carbons; and,

 T_1 is not equal to T_2 when T_1 or T_2 is a double bond;

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 Y_1 and Y_2 are a pair of substituents selected from the group consisting of H and F and Y_1 = Y_2 ;

 Z_1 and Z_2 are a pair of substituents selected from the group consisting of H and F and Z_1 = Z_2 ;

 A_1 and A_2 are a pair of substituents selected from the group consisting of H and F and A_1 = A_2 ;

at least one of the pairs Y₁ and Y₂, Z₁ and Z₂, and A₁ and A₂ is substituted with F; and,

R_m is selected from the group consisting of selected from a group consisting of an alkyl

group having the general formula C_mH_{2m+1} , an alkenyl group having the general formula

 C_mH_{2m-1} , an alkoxy group having the general formula OC_mH_{2m+1} , and an alkenoxy group

having the general formula OC_mH_{2m-1} , wherein m is an integer greater than 0, and;

wherein when T_1 and T_2 are both triple bonds and R_m is an alkyl group, one and only one of the pairs Y_1 and Y_2 , Z_1 and Z_2 , and A_1 and A_2 is substituted with F.

17. (Twice Amended) A method for preparing liquid crystal compounds, comprising the steps of:

a) reacting an iodobenzene as shown in Structure 1 with trimethylsilyl acetylene in the presence of a catalyst and an amine to produce an trimethylsilylacetyl derivative as shown in structure 2;

$$R_n$$
 Z_1
 Z_2

(Structure 1)

$$R_n - \left\langle \begin{array}{c} Z_1 \\ \\ \\ Z_2 \end{array} \right|$$

(Structure 2)

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- b) isolating the trimethylsilylacetyl derivative shown in structure 2 from the reaction of the iodobenzene shown in structure 1 and trimethylsilylacetylene in the presence of the catalyst and the amine;
- c) reacting the trimethylsilylacetyl derivative shown in structure 2 with a base to remove trimethyl silane and to give an unsubstituted product as shown in structure 3;

$$\mathbb{R}_n$$
 \mathbb{Z}_2
 \mathbb{Z}_2

(Structure 3)

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d) isolating the unsubstituted product as shown in structure 3 from the reaction of the trimethylsilylacetyl derivative shown in structure 2 with the base;

e) reacting the unsubstituted product as shown in structure 3 with a brominated, substituted benzene as shown in structure 3a to give a tolane product as shown in structure 4;

$${\tt Br} {\longrightarrow} \hspace{-1em} \begin{array}{c} Y_1 \\ \\ \\ Y_2 \end{array}$$

(Structure 3a)

$$\begin{array}{c} Z_1 \\ COOH \\ \end{array}$$

$$R_n \longrightarrow \begin{array}{c} Z_2 \\ \end{array}$$

10 (Structure 4)

f) isolating the tolane product shown in structure 4 from the reaction of the unsubstituted product as shown in structure 3 with the brominated, substituted benzene brominated, substituted benzene shown in structure 3a;

wherein X is selected from the group consisting of F (fluoro), CN (cyano), OCF₃(trifluoromethoxy), and NCS (isothiocyanate);

Appendix A1 Page 11 of 17

T₁ is a triple bond;

 Y_1 and Y_2 are a pair of substituents selected from the group consisting of H and F, and $Y_1 = Y_2$;

 Z_1 and Z_2 are a pair of substituents selected from the group consisting of H and F, and Z_1 = Z_2 ; and,

At least one of the pairs Y_1 and Y_2 and Z_1 and Z_2 is substituted with F;

 R_n is selected from the group consisting of an alkyl group having the general formula C_nH_{2n+1} , an alkenyl group having the general formula C_nH_{2n-1} , an alkoxy group having the general formula OC_nH_{2n+1} , an alkenoxy group having the general formula OC_nH_{2n-1} , a group of the general structure

$$R_2$$
— $\left\langle \begin{array}{c} \\ \\ \end{array} \right\rangle$ —

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and a group of the general structure

$$R_2$$
 \bigcirc \bigcirc \bigcirc

wherein R_x for both structures is selected from a group consisting of an alkyl group having the general formula C_xH_{2x+1} , an alkenyl group having the general formula C_xH_{2x-1} , an alkoxy group having the general formula OC_xH_{2x+1} , and an alkenoxy group having the general formula OC_xH_{2x-1} and wherein n is an integer and x is an integer. 18. The method for preparing liquid crystal compounds as set forth in claim 17, wherein the catalyst in steps a) and e) is Pd(Ph₃)₂Cl₂/CuI.

19. The method for preparing liquid crystal compounds as set forth in claim 17, wherein the amine in steps a) and e) is triethylamine.

20. The method for preparing liquid crystal compounds as set forth in claim 17, wherein the base in step c) is NaOH.

- 10 21. (Twice Amended) A method for preparing liquid crystal compounds, comprising the steps of:
 - a) reacting an iodobenzene as shown in Structure 5 with trimethylsilyl acetylene in the presence of a catalyst and an amine to produce an trimethylsilylacetyl derivative as shown in structure 6;

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$$R_m \longrightarrow A_l$$
 A_2

(Structure 5)

Appendix A1 Page 13 of 17

$$R_m$$
 \longrightarrow A_1 \longrightarrow A_2 \longrightarrow A_2

(Structure 6)

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b) isolating the trimethylsilylacetyl derivative shown in structure 6 from the reaction of the iodobenzene shown in structure 5 and trimethylsilylacetylene in the present of the catalyst and the amine;

c) reacting the trimethylsilylacetyl derivative shown in structure 6 with a base to remove trimethyl silane and to give an unsubstituted product as shown in structure 7;

$$R_m$$
 A_1
 A_2

(Structure 7)

- d) isolating the unsubstituted product as shown in structure 7 from the reaction of the trimethylsilylacetyl derivative shown in structure 6 with the base;
- e) reacting the unsubstuted product as shown in structure 7 with a substituted bromoiodobenzene as shown in structure 7a in the presence of a catalyst, an amine, and triphenylphosphine to prepare a brominated, substituted tolane product shown in structure 8;

(Structure 7a)

$$R_m$$
 A_1 B_1 B_2 B_3

(Structure 8)

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f) isolating the brominated, substituted tolane product shown in structure 8 from the reaction of the unsubstuted product as shown in structure 7 with the substituted bromoiodobenzene as shown in structure 7a in the presence of the catalyst, the amine, and triphenylphosphine;

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g) reacting the brominated, substituted tolane product shown in structure 8 with trimethylsilylacetylene in the presence of the catalyst, the amine, and triphenylphosphine to produce a trimethylacetyl derivative as shown in structure 9;

$$R_m$$
 X_1 X_2 X_2 X_3 X_4 X_4 X_5 X_6 X_7 X_8 X_8

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(Structure 9)

h) isolating the trimethylacetyl derivative shown in structure 9 from the reaction of the brominated, substituted tolane product shown in structure 8 with trimethylsilylacetylene in the presence of the catalyst, the amine, and triphenylphosphine;

i) reacting the trimethylsilylacetyl derivative shown in structure 9 with a base to remove trimethylsilane and produce an unsubstituted product as shown in structure 10;

$$R_m$$
 A_1
 Z_1
 A_2
 Z_2

(Structure 10)

j) isolating the unsubstituted product shown in structure 10 from the reaction of the trimethylsilyl derivative shown in structure 9 with the base;

k) reacting the unsubstituted product shown in structure 10 with a substituted bromobenzene as shown in structure 10a in the presence of a catalyst, an amine, and triphenylphosphine to produce a bis-tolane product as shown in structure 11;

$$\mathbb{B}r$$
 \longrightarrow \mathbb{Y}_1 \mathbb{X}

Page 16 of 17

(Structure 10a)

$$R_{m} - \left\langle \begin{array}{c} A_{l} \\ \\ A_{2} \end{array} \right\rangle = \left\langle \begin{array}{c} Z_{l} \\ \\ Z_{2} \end{array} \right\rangle X$$

(Structure 11)

1) isolating the bis-tolane product shown in structure 11 from the reaction of the unsubstituted product shown in structure 10 with the substituted bromobenzene shown in structure 10a in the presence of the catalyst, the amine, and triphenylphosphine;

wherein for the structures shown, X is selected from the group consisting of F (fluoro),

10 CN (cyano), OCF₃(trifluoromethoxy), and NCS (isothiocyanate);

T₁ is selected from the group consisting of a triple and a double covalent bond between two carbons;

T₂ is selected from the group consisting of a triple and a double covalent bond between two carbons; and,

15 T_1 is not equal to T_2 when T_1 or T_2 is a double bond;

 Y_1 and Y_2 are a pair of substituents selected from the group consisting of H and F and Y_1 = Y_2 ; Appendix A1 Page 17 of 17

 Z_1 and Z_2 are a pair of substituents selected from the group consisting of H and F and Z_1 = Z_2 ;

 A_1 and A_2 are a pair of substituents selected from the group consisting of H and F and A_1 = A_2 ;

at least one of the pairs Y₁ and Y₂, Z₁ and Z₂, and A₁ and A₂ is substituted with F; and,

R_m is selected from the group consisting of selected from a group consisting of an alkyl group having the general formula C_mH_{2m+1}, an alkenyl group having the general formula C_mH_{2m-1}, an alkoxy group having the general formula OC_mH_{2m+1}, and an alkenoxy group having the general formula OC_mH_{2m-1} and wherein m is an integer.

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22. The method for preparing liquid crystal compounds as set forth in claim 21, wherein the catalyst in steps a), e), g), and k) is Pd(Ph₃)₂Cl₂/CuI.

23. The method for preparing liquid crystal compounds as set forth in claim 21, wherein the amine in steps a), e), g), and k) is triethylamine.

M24. The method for preparing liquid crystal compounds as set forth in claim 21, wherein the base in steps c) and i) is NaOH.



APPENDIX A2

Marked-up CLAIMS

What is claimed is:

1. (Twice Amended) Liquid crystal compounds having the general structure:

$$R_{\overline{n}}$$
 Z_1
 Y_1
 X_2
 Y_2

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(Structure IV)

wherein X is selected from the group consisting of [CN (cyano),]

OCF₃(trifluoromethoxy), and [NSC] NCS (isothiocyanate);

T₁ is a triple bond;

10 Y_1 and Y_2 are a pair of substituents selected from the group consisting of H and F, and Y_1 = Y_2 ;

 Z_1 and Z_2 are a pair of substituents selected from the group consisting of H and F, and Z_1 = Z_2 ; and,

at least one of the pairs Y_1 and Y_2 and Z_1 and Z_2 are substituted with F;

Rn is selected from the group consisting of an alkyl group having the general formula C_nH_{2n+1} , an alkenyl group having the general formula C_nH_{2n-1} , an alkoxy group having the general formula OC_nH_{2n+1} , an alkenoxy group having the general formula OC_nH_{2n-1} , and a group of the general structure

Appendix A2 Page 2 of 15

$$R_{\overline{X}}$$

(Structure VII)

formula C_xH_{2x+1} , an alkenyl group having the general formula C_xH_{2x-1} , an alkoxy group having the general formula OC_xH_{2x+1} , and an alkenoxy group having the general formula OC_xH_{2x-1} ; and,

wherein R_x is selected from a group consisting of an alkyl group having the general

wherein n is an integer greater than 0 and x is an integer greater than 0.

10 8. (Twice Amended) Liquid crystal compounds having the general structure

$$R_{m} \xrightarrow{A_{1}} T_{2} \xrightarrow{Z_{1}} T_{1} \xrightarrow{Y_{1}} X$$

(Structure V)

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wherein X is selected from the group consisting of F (fluoro), OCF₃(trifluoromethoxy), and [NSC] NCS (isothiocyanate);

T₁ is selected from the group consisting of a triple and a double covalent bond between two carbons;

Appendix A2 Page 3 of 15

T₂ is selected from the group consisting of a triple and a double covalent bond between two carbons; and,

 T_1 is not equal to T_2 when T_1 or T_2 is a double bond;

 Y_1 and Y_2 are a pair of substituents selected from the group consisting of H and F and Y_1 = Y_2 ;

 Z_1 and Z_2 are a pair of substituents selected from the group consisting of H and F and Z_1 = Z_2 ;

 A_1 and A_2 are a pair of substituents selected from the group consisting of H and F and A_1 = A_2 ;

- at least one of the pairs Y_1 and Y_2 , Z_1 and Z_2 , and A_1 and A_2 is substituted with F; and, R_m is selected from the group consisting of an alkyl group having the general formula C_mH_{2m+1} , an alkenyl group having the general formula C_mH_{2m-1} , an alkoxy group having the general formula OC_mH_{2m+1} , and an alkenoxy group having the general formula OC_mH_{2m-1} , wherein m is an integer greater than 0; and,
- wherein when T_1 and T_2 are both triple bonds and R_m is an alkyl group, one and only one of the pairs Y_1 and Y_2 , Z_1 and Z_2 , and A_1 and A_2 is substituted with F.
 - 15. (Twice Amended) A eutectic mixture of liquid crystal compounds comprising at least two liquid crystal compounds, including at least one compound having the general
- 20 structure

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$$R_{n}$$
 Z_{1}
 X_{1}
 X_{2}
 X_{2}

(Structure IV)

wherein X is selected from the group consisting of [CN (cyano),]

OCF3(trifluoromethoxy), and [NSC] NCS (isothiocyanate);

5 T_1 is a triple bond;

 Y_1 and Y_2 are a pair of substituents selected from the group consisting of H and F and Y_1 = Y_2 ;

 Z_1 and Z_2 are a pair of substituents selected from the group consisting of H and F and Z_1 = Z_2 ;

10 at least one of the pairs Y_1 and Y_2 and Z_1 and Z_2 are substituted with F;

 R_n is selected from the group consisting of an alkyl group having the general formula C_nH_{2n+1} , an alkenyl group having the general formula C_nH_{2n-1} , an alkoxy group having the general formula OC_nH_{2n+1} , an alkenoxy group having the general formula OC_nH_{2n-1} , and a group of the general structure

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$$R_{\overline{X}} - \left\langle \begin{array}{c} O \\ \\ O \end{array} \right\rangle$$

(Structure VII)

Appendix A2 Page 5 of 15

wherein R_x is selected from a group consisting of an alkyl group having the general formula C_xH_{2x+1} , an alkenyl group having the general formula C_xH_{2x-1} , an alkoxy group having the general formula $-OC_xH_{2x+1}$, and an alkenoxy group having the general formula $-OC_xH_{2x-1}$; and,

5 wherein n is an integer greater than 0 and x is an integer greater than 0

16. (Twice Amended) A eutectic mixture of liquid crystal compounds comprising at least two liquid crystal compounds including at least one compound having the general structure

$$R_m - \underbrace{ \begin{pmatrix} A_1 & & Z_1 & & Y_1 \\ & & & & \\ A_2 & & & Z_2 & & Y_2 \end{pmatrix}}_{X_1} - \underbrace{ \begin{pmatrix} Y_1 & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & \\ & &$$

(Structure V)

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wherein X is selected from the group consisting of F (fluoro), OCF₃(trifluoromethoxy), and [NSC] NCS (isothiocyanate);

 T_1 is selected from the group consisting of a triple and a double covalent bond between two carbons;

T₂ is selected from the group consisting of a triple and a double covalent bond between two carbons; and,

 T_1 is not equal to T_2 when T_1 or T_2 is a double bond;

Appendix A2 Page 6 of 15

 Y_1 and Y_2 are a pair of substituents selected from the group consisting of H and F and Y_1 = Y_2 ;

 Z_1 and Z_2 are a pair of substituents selected from the group consisting of H and F and Z_1 = Z_2 ;

- 5 A_1 and A_2 are a pair of substituents selected from the group consisting of H and F and A_1 = A_2 ;
 - at least one of the pairs Y_1 and Y_2 , Z_1 and Z_2 , and A_1 and A_2 is substituted with F; and, R_m is selected from the group consisting of selected from a group consisting of an alkyl group having the general formula C_mH_{2m+1} , an alkenyl group having the general formula C_mH_{2m+1} , and an alkenoxy group having the general formula OC_mH_{2m+1} , and an alkenoxy group having the general formula OC_mH_{2m-1} , wherein m is an integer greater than 0, and; wherein when T_1 and T_2 are both triple bonds and R_m is an alkyl group, one and only one of the pairs Y_1 and Y_2 , Z_1 and Z_2 , and Z_2 , and Z_3 is substituted with Z_3 .

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- 15 17. (Twice Amended) A method for preparing liquid crystal compounds, comprising the steps of:
 - a) reacting an iodobenzene as shown in Structure 1 with trimethylsilyl acetylene in the presence of a catalyst and an amine to produce an trimethylsilylacetyl derivative as shown in structure 2;

$$R_n$$
— Z_1
 Z_2

(Structure 1)

$$\mathbb{R}_n$$
 \longrightarrow
 \mathbb{S}_1
 \mathbb{S}_2

(Structure 2)

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- b) isolating the trimethylsilylacetyl derivative shown in structure 2 from the reaction of the iodobenzene shown in structure 1 and trimethylsilylacetylene in the presence of the catalyst and the amine;
- c) reacting the trimethylsilylacetyl derivative shown in structure 2 with a base to remove trimethyl silane and to give an unsubstituted product as shown in structure 3;

$$R_n \longrightarrow Z_1$$
 Z_2

(Structure 3)

Appendix A2 Page 8 of 15

d) isolating the unsubstituted product as shown in structure 3 from the reaction of the trimethylsilylacetyl derivative shown in structure 2 with the base;

e) reacting the unsubstituted product as shown in structure 3 with a brominated, substituted benzene as shown in structure 3a to give a tolane product as shown in structure 4;

$$\mathbb{B}_r \longrightarrow \mathbb{Y}_1$$
 \mathbb{Y}_2

(Structure 3a)

$$R_n$$
 Z_1
 Y_1
 Z_2
 Y_2

10 (Structure 4)

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f) isolating the tolane product shown in structure 4 from the reaction of the unsubstituted product as shown in structure 3 with the brominated, substituted benzene brominated, substituted benzene shown in structure 3a;

wherein X is selected from the group consisting of F (fluoro), CN (cyano),

OCF₃(trifluoromethoxy), and [NSC] NCS (isothiocyanate);

Appendix A2 Page 9 of 15

 T_1 is a triple bond;

 Y_1 and Y_2 are a pair of substituents selected from the group consisting of H and F, and $Y_1 = Y_2$;

 Z_1 and Z_2 are a pair of substituents selected from the group consisting of H and F, and Z_1 5 = Z_2 ; and,

At least one of the pairs Y_1 and Y_2 and Z_1 and Z_2 is substituted with F;

 R_n is selected from the group consisting of an alkyl group having the general formula C_nH_{2n+1} , an alkenyl group having the general formula C_nH_{2n-1} , an alkoxy group having the general formula OC_nH_{2n+1} , an alkenoxy group having the general formula OC_nH_{2n-1} , a group of the general structure

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and a group of the general structure

$$R_2$$
— \bigcirc O

wherein R_x for both structures is selected from a group consisting of an alkyl group having the general formula C_xH_{2x+1} , an alkenyl group having the general formula C_xH_{2x-1} , an alkoxy group having the general formula OC_xH_{2x+1} , and an alkenoxy group having the general formula OC_xH_{2x-1} and wherein n is an integer and x is an integer. Appendix A2 Page 10 of 15

21. (Twice Amended) A method for preparing liquid crystal compounds, comprising the steps of:

a) reacting an iodobenzene as shown in Structure 5 with trimethylsilyl acetylene in the presence of a catalyst and an amine to produce an trimethylsilylacetyl derivative as shown in structure 6;

$$R_m \longrightarrow A_1$$

$$A_2$$

(Structure 5)

$$\mathsf{R}_m - \bigvee_{\mathsf{A}_2}^{\mathsf{A}_1} - \bigvee_{\mathsf{A}_2}^{\mathsf{A}_1} - \bigvee_{\mathsf{A}_2}^{\mathsf{A}_2} - \bigvee_{\mathsf{A}_2}^$$

10 (Structure 6)

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b) isolating the trimethylsilylacetyl derivative shown in structure 6 from the reaction of the iodobenzene shown in structure 5 and trimethylsilylacetylene in the present of the catalyst and the amine;

Appendix A2 Page 11 of 15

c) reacting the trimethylsilylacetyl derivative shown in structure 6 with a base to remove trimethyl silane and to give an unsubstituted product as shown in structure 7;

$$R_m$$
 A_1
 A_2

5 (Structure 7)

10

- d) isolating the unsubstituted product as shown in structure 7 from the reaction of the trimethylsilylacetyl derivative shown in structure 6 with the base;
- e) reacting the unsubstuted product as shown in structure 7 with a substituted bromoiodobenzene as shown in structure 7a in the presence of a catalyst, an amine, and triphenylphosphine to prepare a brominated, substituted tolane product shown in structure 8;

$$I \longrightarrow Z_1$$
 Z_2 Z_2

(Structure 7a)

Appendix A2 Page 12 of 15

$$R_m$$
 A_1
 A_2
 A_2
 A_2
 A_2
 A_2
 A_2
 A_2
 A_2
 A_2
 A_3
 A_4
 A_5
 A_5
 A_5
 A_5
 A_5
 A_5
 A_5
 A_5

(Structure 8)

5

10

15

f) isolating the brominated, substituted tolane product shown in structure 8 from the reaction of the unsubstuted product as shown in structure 7 with the substituted bromoiodobenzene as shown in structure 7a in the presence of the catalyst, the amine, and triphenylphosphine;

g) reacting the brominated, substituted tolane product shown in structure 8 with trimethylsilylacetylene in the presence of the catalyst, the amine, and triphenylphosphine to produce a trimethylacetyl derivative as shown in structure 9;

$$R_m$$
 A_1 Z_1 A_2 A_2 A_2 A_2 A_2 A_2 A_3 A_4 A_5 A_5

(Structure 9)

h) isolating the trimethylacetyl derivative shown in structure 9 from the reaction of the brominated, substituted tolane product shown in structure 8 with trimethylsilylacetylene in the presence of the catalyst, the amine, and triphenylphosphine;

i) reacting the trimethylsilylacetyl derivative shown in structure 9 with a base to remove trimethylsilane and produce an unsubstituted product as shown in structure 10;

5 (Structure 10)

10

j) isolating the unsubstituted product shown in structure 10 from the reaction of the trimethylsilyl derivative shown in structure 9 with the base;

k) reacting the unsubstituted product shown in structure 10 with a substituted bromobenzene as shown in structure 10a in the presence of a catalyst, an amine, and triphenylphosphine to produce a bis-tolane product as shown in structure 11;

$$\text{Br} - \bigvee_{Y_2}^{Y_1} X$$

(Structure 10a)

$$R_m$$
 X_1
 X_2
 X_2
 X_2
 X_3
 X_4
 X_4
 X_4
 X_4
 X_4
 X_4
 X_4
 X_5
 X_6
 X_7
 X_8

Appendix A2 Page 14 of 15

(Structure 11)

5

l) isolating the bis-tolane product shown in structure 11 from the reaction of the unsubstituted product shown in structure 10 with the substituted bromobenzene shown in structure 10a in the presence of the catalyst, the amine, and triphenylphosphine;

wherein for the structures shown, X is selected from the group consisting of F (fluoro), CN (cyano), OCF₃(trifluoromethoxy), and [NSC] NCS (isothiocyanate);

T₁ is selected from the group consisting of a triple and a double covalent bond between
 two carbons;

T₂ is selected from the group consisting of a triple and a double covalent bond between two carbons; and,

 T_1 is not equal to T_2 when T_1 or T_2 is a double bond;

 Y_1 and Y_2 are a pair of substituents selected from the group consisting of H and F and Y_1 15 = Y_2 ;

 Z_1 and Z_2 are a pair of substituents selected from the group consisting of H and F and Z_1 = Z_2 ;

 A_1 and A_2 are a pair of substituents selected from the group consisting of H and F and A_1 = A_2 ;

at least one of the pairs Y_1 and Y_2 , Z_1 and Z_2 , and A_1 and A_2 is substituted with F; and,

Appendix A2 Page 15 of 15

 R_m is selected from the group consisting of selected from a group consisting of an alkyl group having the general formula C_mH_{2m+1} , an alkenyl group having the general formula C_mH_{2m-1} , an alkoxy group having the general formula OC_mH_{2m+1} , and an alkenoxy group having the general formula OC_mH_{2m-1} and wherein m is an integer.